

A review of the subspecies of *Zegris eupheme* (Lepidoptera, Pieridae) from the former USSR

Обзор подвидов *Zegris eupheme* (Lepidoptera, Pieridae) на территории бывшего СССР

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A brief review of three subspecies of *Zegris eupheme* (Esper, [1804]) known from the territory of the former USSR is proposed and its diagnostic features are listed. The neotype of *Zegris eupheme tschudica* Herrich-Schäffer, [1850] and lectotypes of *Z. eupheme sulphurea* O. Bang-Haas, 1927, *Pontia erothoe* Eversmann, 1832 and *Papilio eupheme* Esper, [1804] are designated. *Zegris eupheme tschudica* Herrich-Schäffer, [1850] is synonymized to *Zegris eupheme erothoe* (Eversmann, 1832); *Zegris eupheme dyala* Peile, 1921 and *Zegris eupheme tigris* Riley, 1921 are synonymized to *Zegris eupheme menestho* (Ménétriés, 1832).

Проведена краткая ревизия подвидов *Zegris eupheme* (Esper, [1804]), известных с территории бывшего СССР, и определены их диагностические признаки. Обозначены неотип *Zegris eupheme tschudica* Herrich-Schäffer, [1850] и лектотипы *Papilio eupheme* Esper, [1804], *Pontia erothoe* Eversmann, 1832 и *Z. eupheme sulphurea* O. Bang-Haas, 1927. *Zegris eupheme tschudica* Herrich-Schäffer, [1850] синонимизируется с *Zegris eupheme erothoe* (Eversmann, 1832); *Zegris eupheme dyala* Peile, 1921 и *Zegris eupheme tigris* Riley, 1921 синонимизируются с *Zegris eupheme menestho* (Ménétriés, 1832).

Key words: butterflies, distribution, Pieridae, *Zegris*, subspecies, primary types, new synonyms

Ключевые слова: бабочки, распространение, Pieridae, *Zegris*, подвиды, номенклатурные типы, новая синонимия

INTRODUCTION

In the recently published book about butterflies of Europe and Mediterranean (Tshikolovets, 2011), the species-group taxon *Zegris eupheme tschudica* Herrich-Schäffer, [1850] has a species rank. This rank was supported exclusively by external features, namely by “...more developed white spots on underside of hindwings...” (Tshikolovets, 2011: 123), which is surely insufficient for delimitation of the very variable representatives of the genus *Zegris* Boisduval, [1836]. Unfortunately, the type material of this taxon has been probably

lost; no type specimens were found either in the Museum für Naturkunde in Berlin (where one part of Herrich-Schäffer's Macrolepidoptera collection purchased by O. Staudinger is preserved), nor in the Zoologisches Staatssammlung in München (where another part of collection bought by J. Bastelberg is now presented). In process of the present work some other type specimens have been found, name-bearing types have been designated, and distribution of subspecies have been clarified.

The status and position of subspecies, distributed outside the former USSR (*urda* Hemming, 1929 from North Israel and

Jordan; *larseni* Pittaway, 1986 from North-West Saudi Arabia; *meridionalis* Lederer, 1852 from Spain; *maroccana* Bernardi, 1950 from Middle and High Atlas mountain ridges in Morocco), are not considered here.

MATERIAL AND METHODS

Material from the following collections was studied: Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia (ZISP), Zoological Museum of the Moscow State University, Moscow, Russia (ZMMU), Zoological Museum of the Kazan University, Kazan, Russia (ZMKU), Finnish Natural History Museum of the University of Helsinki, Finland (ZMUH), Museum für Naturkunde Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin, Germany (ZMHU), numerous private collections and the author's own material, collected in various parts of South Russia (Volograd, Saratov, Astrakhan Provinces) and South Kazakhstan (Alma-Ata Province and Dzhungarian Alatau Mts.).

TAXONOMY

The most elements of wing pattern in *Zegris eupheme* are very variable, especially white spots and green or greenish pattern in the hindwing underside, shape of discal spot in the forewing upper side, etc. (Fig. 1). The genital structures are not so variable. According to my study of 20 male genitalia preparates from different regions (Russia: Saratov Prov., Sinenkie; Astrakhan Prov., Dosang; Crimea, Sevastopol; Kazakhstan: Atyrau Prov., Inderskoe Lake; China: Kuldja; Turkey: Amasia; Spain: Malaga), most variable is the shape of valva which dorsal edge can be straight or curved (Figs 2, 3). Basing on the variability, which have clinal type from north to south (especially good visible in wings pattern; see Fig. 1), we may conclude that the populations of *Z. eupheme* from the left shore of Volga presents one subspecies, from the right shore, second subspecies, and southwards from Great Caucasus Ridge, third subspecies.

Zegris eupheme eupheme (Esper, [1804]) (Figs. 1a, b; 3–5, 10, 11)

Papilio eupheme Esper, [1804]: 105, tab. 113, figs 2, 3. Type locality: "...in der Gegend von Sevastopol in Taurien". Type material is not found yet; it may be lost (Nekrutenko, 1990: 77), but recently some types of E.J.C. Esper have been already found in the collection of Staatssammlung München, Germany (Grieshuber, 2006: 86).

Zegris eupheme Esp. ♀ ab. *modesta* Alphéraky, 1908: 563. Type locality: Taganrog vicinity. Established clearly as an infrasubspecific taxon, thus unavailable. Type material not studied.

Zegris eupheme Esp., ab. *ochracea* Alphéraky, 1913: 228. Type locality: not stated. Established clearly as an infrasubspecific taxon, thus unavailable. Type material not studied.

Zegris eupheme sulphurea O. Bang-Haas, 1927: 40. Type locality: "Thianchan sept.: Kuld-scha, Ili Gebiet... am Flusse bei Lepsa beim Balkasch See (Siebenstromland)" by the original description, "Lepsa" (now Lepsi settlement in the Alakol distr. of Almaty Province, northern foothills of Dzhungarsky Alatau Mts., Kazakhstan) after the lectotype designation. Type material in ZMHU (studied). Treated here as a synonym of the nominative subspecies.

Type designation. The original description of *Papilio eupheme* based on two specimens (first from P.S. Pallas, second from K. Blöber). According to this reason and by the rules of Art. 74.4 of the ICZN (1999), a male specimen figured in tab. 113 (fig. 2, 3) of the Esper's book "Die Schmetterlinge in Abbildungen nach der Natur mit Beschreibungen" **is designated here** as a lectotype of *Papilio eupheme* (Esper, [1804]); both figures and original description are reprinted here (Fig. 10).

The original description of *Zegris eupheme sulphurea* based on the uncertain number of specimens from the collections of Tancre and Staudinger (ZMHU). According to this reason and by the rules of Art. 61.1 and Art. 74.1 of the ICZN (1999), a male specimen with labels: "*eupheme* / *sulphurea* / OBH" (white paper, handwritten); "Horae Macrolep. / Vol. I abgebildet / t. – f. – / beschrieb

Differences between *Zegris eupheme* subspecies

| Feature/ subspecies | <i>eupheme</i> | <i>menestho</i> | <i>erothoe</i> |
|---|--|--|---|
| Hindwing underside coloration | Dark-greenish and yellow- orange, both colors almost equally presented in males, dark-greenish more developed in females (yellow-orange may be completely reduced) | Greenish or light- greenish and purely yellow, the latter is more developed in both males and females | Greenish; orange and yellow normally never present |
| White spots on hindwing underside | Small and rounded or square, with distinct borders; may present or almost absent in specimens from the same population | Small and rounded, with indistinct borders in northern specimens and almost absent in southern specimens | Big and long-oval, with distinct borders; size of spots is quite variable, but they are always bigger (up to 30%) than in other subspecies |

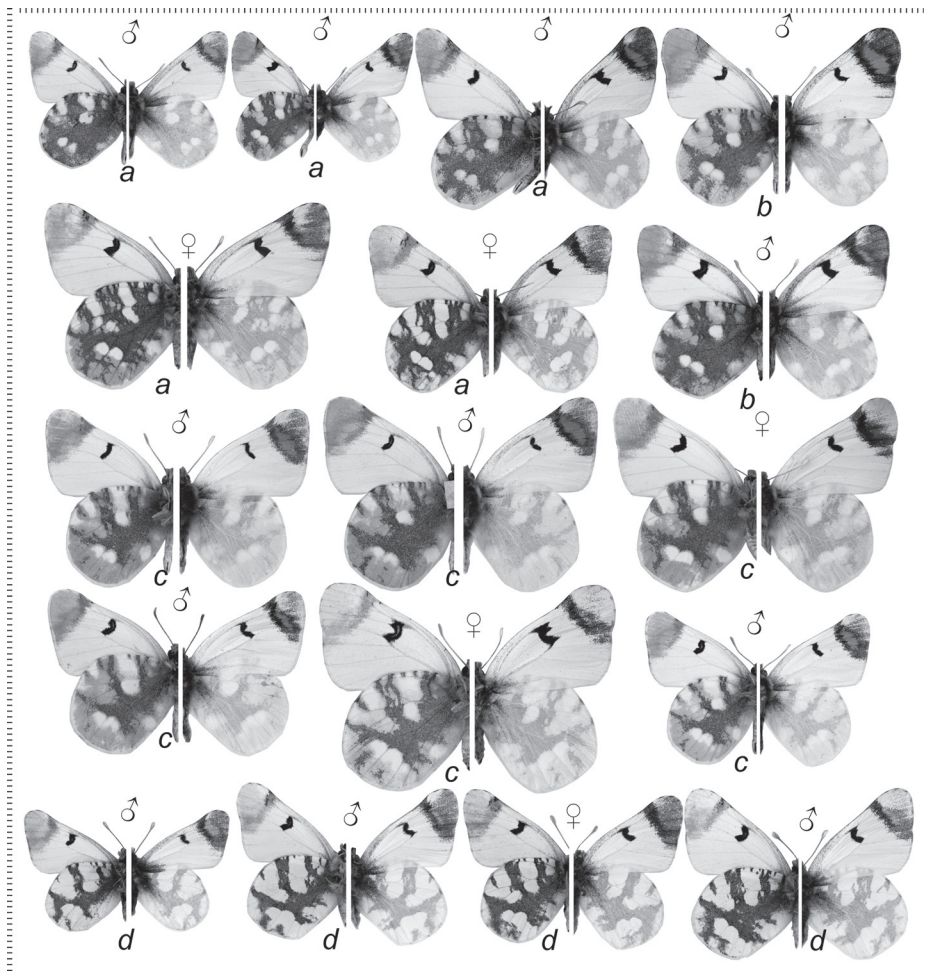
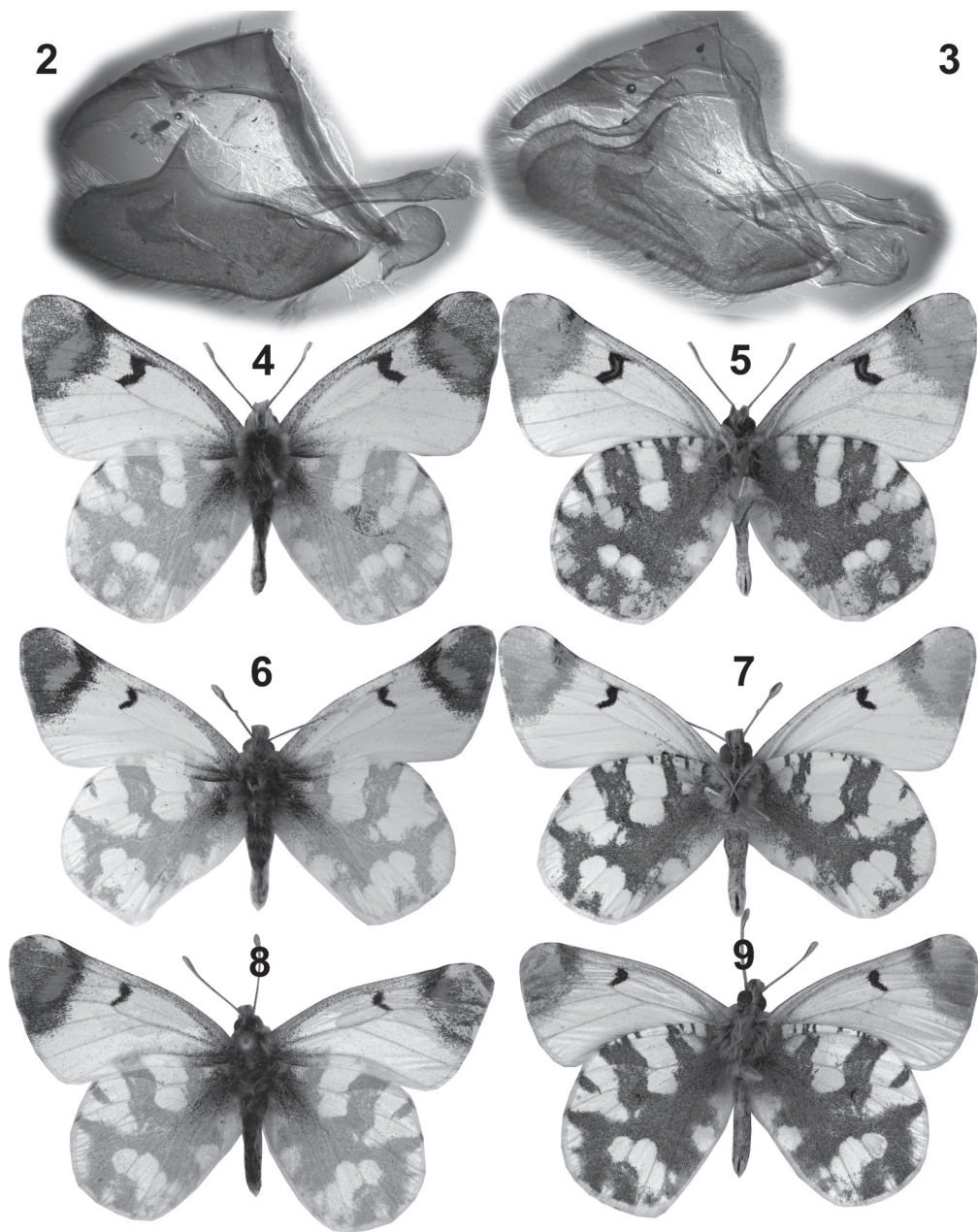


Fig. 1. Wing pattern of *Zegris eupheme*: a, Sarepta (typical *eupheme*); b, Kuldja (paralectotypes of *sulphurea*); c, Amasia (*menestho*); d, Indersk (*erothoe*). Scale 1 mm.



Figs 2–9. Type specimens of *Zegris eupheme*. 2, 3, male genitalia (2, *tschudica*, neotype; 3, *sulphurea*, lectotype); 4–9, general appearance (4, 5, *sulphurea*, lectotype; 6, 7, *tschudica*, neotype; 8, 9, *erethoe*, lectotype). Even numbers, upper side, odd numbers, underside.

p. 40" (white paper, printed/handwritten); "ex coll. / STAUDINGER" (white paper, printed); "Studied by S. Korb / ZMHB / 042K/2013" (white paper, printed); "Lepsa / Hbhr." (brown paper, handwritten);

"LECTOTYPUS ♂ / *sulphurea* / B.-H. / S.K.Korb des. 08–16.01.2013" (red paper, printed, with handwritten sex, name and authorship), **is designated here** as a lectotype of *Zegris eupheme sulphurea* O. Bang-



Tab. CXIII. C. 68. P. EUPHEME. Der P. Eupheme. 105

Der zweyhundert und achtzehente europäische Tagfalterling.

Pap. Dan. cand. EUPHEME. Der P. Eupheme.

Tom. I. Tab. CXIII. Cont. 68.

Fig. 2. Der Falter von beiden Oberseiten, fig. 3. von beiden Unterseiten.

*Alis integerrimis rotundatis albis; superioribus supra macula ovali fulva, utrinque lunula media nigra; inferioribus subtus flavis, maculis albis-virescentibusque nebulo-
losis.*

Dieser mit so auszeichnendem Fuß geschmückte Falter, hat sich als eine neue Gattung, vor drey Jahren in der Gegend von Sewastopol in Laurien vorgefunden, er gehört also mit Recht zu den europäischen Arten. Zur Zeit sind nur zwey Exemplare erbeutet worden. Das erste wurde Herrn Collegialrath, Ritter von Pallas mitgetheilt, das zweyte kam in die Sammlung des Herrn Staatsraths, Ritter von Blöber zu Petersburg. Durch die Güte dieses Gönners, dem wir schon so viele der wichtigsten Beiträge zu danken haben, erhielt ich die vorliegende Abbildung, nebst der gleichfalls neuentdeckten, folgenden Gattung. Um nichts in der Genauigkeit zu verlihren, habe ich nach Maassgabe dieser Verstellungen, die beyden Ober- und Unterseiten, unverändert ge-
lassen.

In dem bunten Gewand hält dieser Falter das Mittel zwischen dem P. Cardamines, dem er in dem Umriß so wie auch in der Größe gleichkommt, und nach den Farben dem P. Belia, oder zugleich dem P. Eupheno. Unter den ausländischen Faltern zeigen sich mehrere ähnliche Verwandte, die aber nach andern Veränderungen, wiederum wesentlich verschieden sind. Die Vorderflügel haben mit dem P. Cardamines gleiche Grundfarbe, und auch den mondformigen schwarzen Flecken in der Mitte, gemein, wiewohl er in größerer Stärke gebildet ist. Die Flügelspitze hat eine schwärzliche grüne, mit Gelben, wolfig gemischte Farbe. Anstatt des über die Hälfte einnehmenden Oraniengelbs, ist hier eine ablangrunde Macel von gleicher Farbe, in einem schwärzlichem Saum gefaßt. Die untere Seite hat statt dieser Verzierung, nur eine gelbliche Fläche an der vordern Flügelspitze. Die obere Seite der Hinterflügel ist mit der obern der Vorderflügel von gleicher Grundfarbe, ohne weiteren Besatz, sie hat nur von der untern Fläche durchscheinende wollichte Flecken. Die untere hingegen weicht um so beträchtlicher ab. Diese Seite hat nach dem weissen Flecken, die nächste Aehnlichkeit mit der des P. Daplidice.

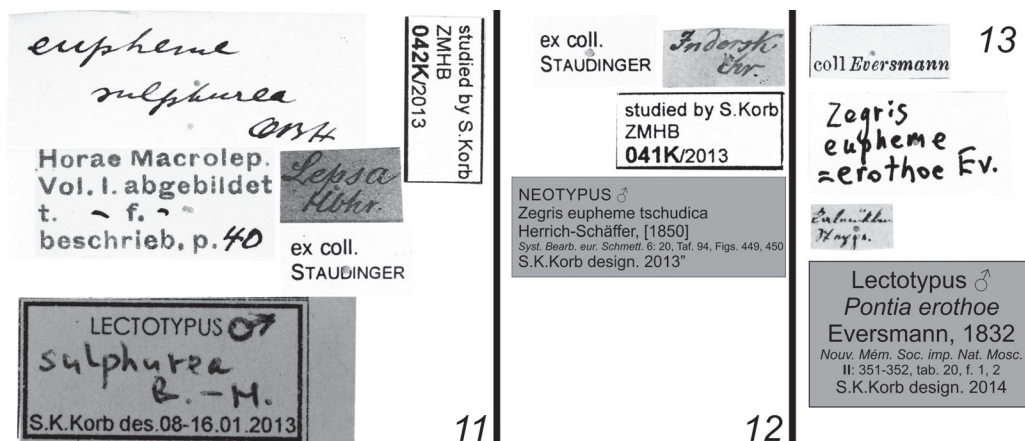
Supplementband, 1r Abschn.

[P]

106 Fortsetzung der europäischen Schmetterlinge. Erster Abschnitt.

Die Maceln aber sind größer, und die Grundfarbe ist ein blasses Gelb, das dem des P. Eupheno nahe kommt, es ist überdies mit grünlichen Aromen, die wollichte Flecken bilden, vermengt. Der Körper ist wie an dem P. Cardamines schwärzlich, auf der untern Seite aber gelblich. Die Fühlhörner führen eine weiße Kolbe. Der weibliche Falter ist zur Zeit noch nicht bekannt.

Fig. 10. Original description of *Papilio eupheme* (after Esper, [1804]).



Figs. 11–13. Labels of *Zegrus eupheme* primary types. **11** – *sulphurea*, lectotype; **12** – *tschudica*, neotype; **13** – *erothoe*, lectotype.

Haas, 1927 (Figs 3, 4, 5, 11). Two specimens (male and female) are designated as paralectotypes.

Distribution (Fig. 14). Crimea, southern part of Eastern Europe northwards to Khar'kov Prov. in Ukraine and Ulyanovsk Prov. in Russia, eastwards to the sands on the left bank of Volga river in Astrakhan, Volgograd and Samara Provinces, and southwards to the northern slope of the Great Caucasus and northern sands of Kazakhstan; South-East Kazakhstan: northern foothills of Transili Alatau Mts., Dzhungarsky Alatau Mts., western spurs of Ketmen Mts. and Saisan lake environs. The following records are known to me only by the published data: Barnaul (Tshikolovets et al., 2009), Omsk (Kosterin, Ponomarev, 2002), Tengiz Lake (Lukhtanov, Lukhtanov, 1994). It is still not found in South Ural and adjacent territories at the current time; only 2 rather old male specimens from R. Püngeler collection labelled "Ural, Miass" are known.

***Zegrus eupheme erothoe* (Eversmann, 1832)**
(Figs 1d, 2, 6–9, 12, 13)

Pontia erothoe Eversmann, 1832: 351, taf. 20, figs 1, 2. Type locality: "...in monticulis Tschaptschatschi deserti australioris inter Rhynnum et Wolgam" [now station Chapchachi (Чапчачи), Kharabolinsky district, Astra-

khan Province, 47°31'54''N, 47°07'57''E]. Type material in ZISP and ZMKU (studied). *Anthocharis eupheme* var. *tschudica* Herrich-Schäffer, [1850]: 20, taf. 94, figs 449, 450), **syn. nov.** Type locality: not specified in the original description [Kirgis steppes, N.-W. Kazakhstan] (Tshikolovets, 2011: 123). In the revision of S. Alpheraky (1913: 229) it is the following list of localities for this taxon: "Gouriev, Astrakhan; Perse méridionale; ?Emba inférieure; ?lac. Indersk". The city of Gouriev (=Guryev) is now Atyrau, administrative center in North-West Kazakhstan. Type material lost.

Type designation. Four male specimens of *Pontia erothoe* from the collection of E. Eversmann are found: one in the Zoological Institute of Russian Academy of Sciences in St. Petersburg and three in the Zoological Museum of the Kazan University. According to this reason and by the rules of Art. 61.1 and Art. 74.1 of the ICZN (1999), a male specimen kept in ZISP with labels: "Coll Eversmann" (white paper, printed); "*Zegrus* / *eupheme* / =*erothoe* Ev." (white paper, handwritten); "Kalmukken | Steppe" (white paper, handwritten); "Lectotypus ♂ / *Pontia erothoe* / Eversmann, 1832 / Nouv. Mém. Soc. imp. Nat. Mosc. / II: 351–352, tab. 20, f. 1, 2 / S.K. Korb design. 2014" (red paper, printed) is designated here as a lectotype of *Pontia erothoe* Eversmann,

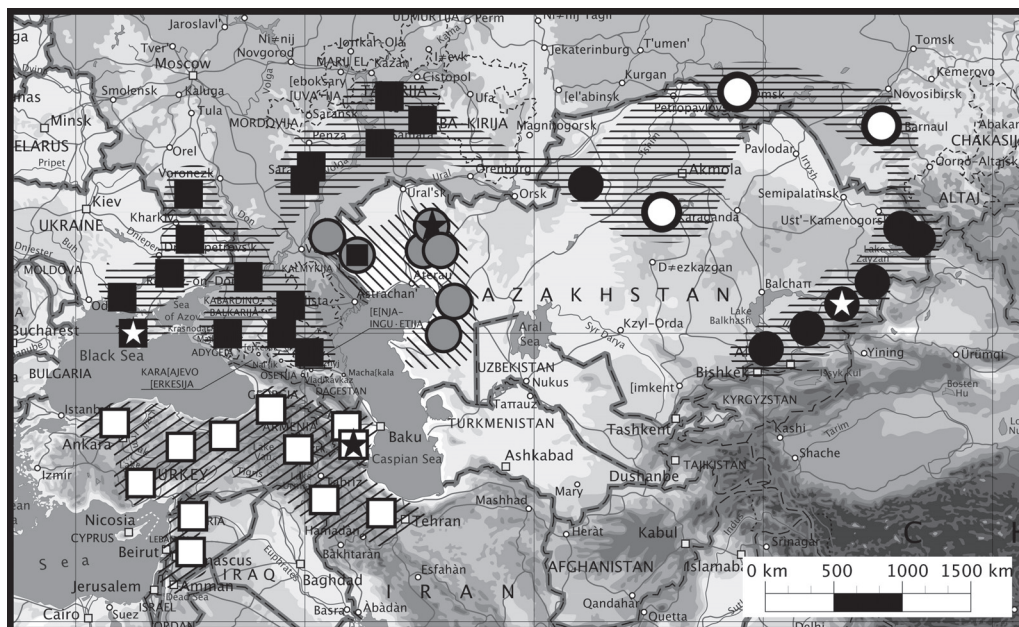


Fig. 14. Distribution map of *Zegrus eupheme* subspecies. Black squares, *eupheme* (type locality with asterisk); white squares, *menestho* (type locality with asterisk); black circles, *sulphurea* (type locality with asterisk); grey circles, *erothoe* (type locality of *erothoe* with square, type locality of *tschudica* with asterisk); white circles, localities of material known to the author only by the literary data.

1832. The specimens kept in ZMKU, all with two handwritten labels “Eupheme / k 141” and “Des[ertum]Kirg[isorum]/g”, are designated as paralectotypes.

The original material of *Anthocharis eupheme* var. *tschudica* probably lost, and selection of name-bearing type is necessary to define the nominal taxon objectively. According to this reason and by the rules of Art. 75 of the ICZN (1999), the oldest known male specimen in the collection of Staudinger (ZMHU) clearly determined as belonging to this taxon (mounted under the label “var. *Tschudica*”) with labels: “Indersk / Chr.” (white paper, printed); “ex coll. / STAUDINGER” (green paper, handwritten); “Studied by S. Korb / ZMHB / 041K/2013” (white paper, printed); “NEOTYPUS ♂ / *Zegrus eupheme tschudica* / Herrich-Schäffer, [1850] / Syst. Bearb. eur. Schmett. 6: 20, taf. 94, figs 449, 450 / S.K. Korb design. 2013” (red paper, printed) **is designated here** as a neotype of *Zegrus eupheme tschudica* Herrich-Schäffer, [1850].

Distribution (Fig. 14). Only known from the North-West Kazakhstan, environs of Atyrau, Inderbor (lake Inderskoye) and north-eastern coast of Caspian Sea southwards to Shetpe, and at the right bank of Volga river (Astrakhan Prov.: Dosang, Bogdo-Baskunchak Nature Reserve).

Zegrus eupheme menestho

(Ménétriés, 1832)

(Fig. 1c)

Pieris menestho Ménétriés, 1832: 245. Type locality: “Mont. Taliisch, ...Lenkoran”. Type material (lectotype and paralectotype, designated by Nekrutenko, 1990: 75, pl. 27, fig. 2) in ZISP.

Zegrus eupheme dyala Peile, in Rowland-Brown, 1921: 151, **syn. n.** Type locality: “...at Fathah on the right bank of the Tigris”. Type material not studied.

Zegrus eupheme tigris Riley, 1921: 591–592, **syn. n.** Type locality: Fathah, right. bank river Tigris. Type material not studied.

Remarks. *Pieris menestho*, now treated as subspecies of *Zegris eupheme*, has rather wide range in Western Asia. Two other subspecies of the latter, *Z. eupheme dyala* and *Z. eupheme tigris*, have the same type locality and should be synonymized; moreover, this locality is placed within the range of *Zegris eupheme menestho*. So far as the original descriptions of both subspecies demonstrate characters going into the scope of variability observed in *Zegris eupheme menestho*, it is quite reasonable to synonymize here all three names.

Distribution (Fig. 14). Transcaucasia, Turkey, North-West Iran, Syria, and Lebanon, northwards to the southern slope of Great Caucasus Ridge.

ACKNOWLEDGEMENTS

I am very glad to thank curators of the Lepidoptera collections: S.Yu. Sinev and A.L. Lvovsky (Zoological Institute of the Russian Academy of Sciences), A.V. Sviridov (Zoological Museum of the Moscow State University), L. Kaila (Finnish Natural History Museum of the University of Helsinki), W. Mey (Museum für Naturkunde an der Humboldt Universität zu Berlin), who provided me possibility to work with its material; and to A.Yu. Matov (Zoological Institute of the Russian Academy of Sciences) for providing photographs of the type specimen of *Pontia erothoe*. For information and pictures of the type specimens of *Pontia erothoe* from Kazan University as far as for the critical reading of this manuscript and valuable additions and corrections I am very thankful to V.V. Zolotukhin (Ulyanovsk State Pedagogical University).

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Received 10 February 2015 / Accepted 15 May 2017